Human-Vehicle Integration in EU-AdaptIVe

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TOWARDS INTELLIGENT MOBILITY
Better use of space

Organised by Co-organised by Hosted by On behalf of Supported by

EU-AdaptIVe

FACTS

Budget:	EUR 25 Million
Funding (EC):	EUR 14,3 Million
Duration:	42 Month (Jan. 2014 – Jun. 2017)
Coordinator:	Volkswagen Group Research
28 Partners from:	France, Germany, Greece, Italy, Spain, Sweden, The Netherlands, UK

WEB

www.adaptive-ip.eu

EU-AdaptIVe

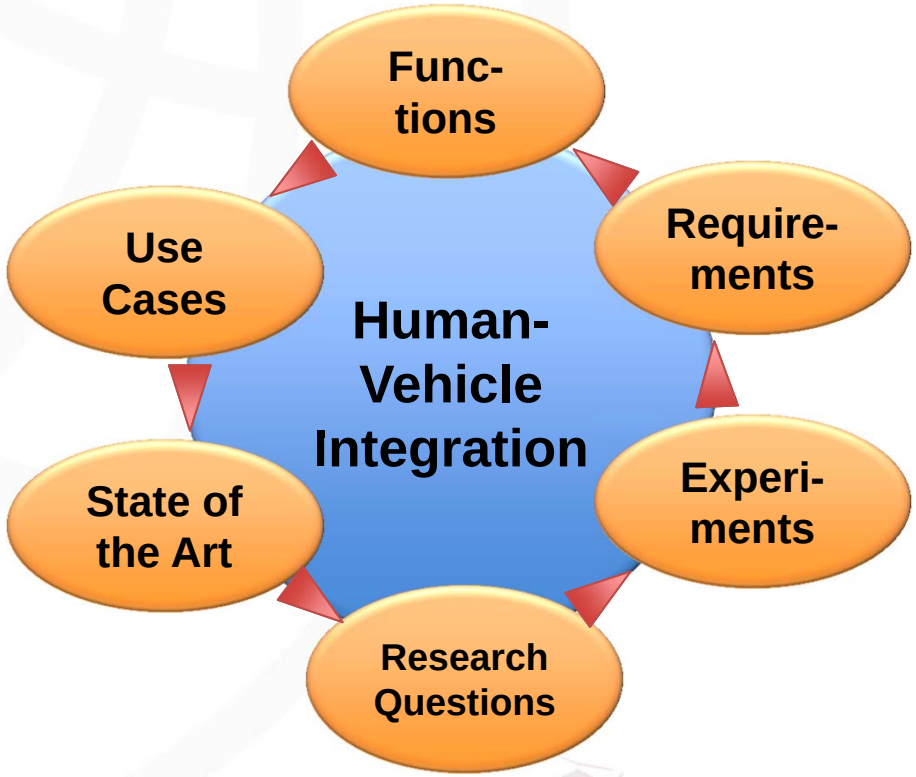
Main goal: Research, develop & demonstrate highly automated vehicle functions

SP3: Human-Vehicle Integration

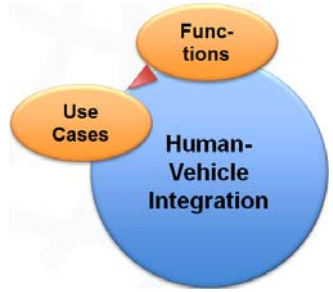
Main goals:

- **Support** partners with Human Factors (HF) knowledge
- **Homogenize** development by providing HF-requirements

- **Collect technical functions** to be developed within AdaptIVe
- **Develop use cases** for test and development of functions
- **Collect existing HF-requirements**
- **Find** still unresolved Human-Vehicle Integration **research questions**
- **Conduct experiments**
- **Create new HF-requirements**

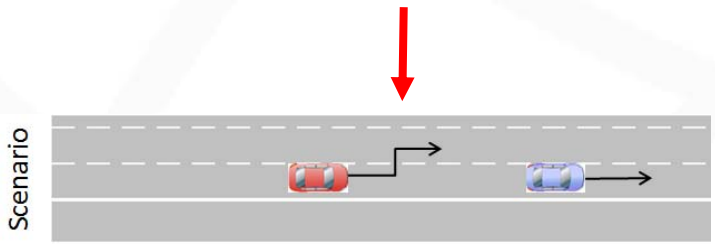


Functions & Use Cases

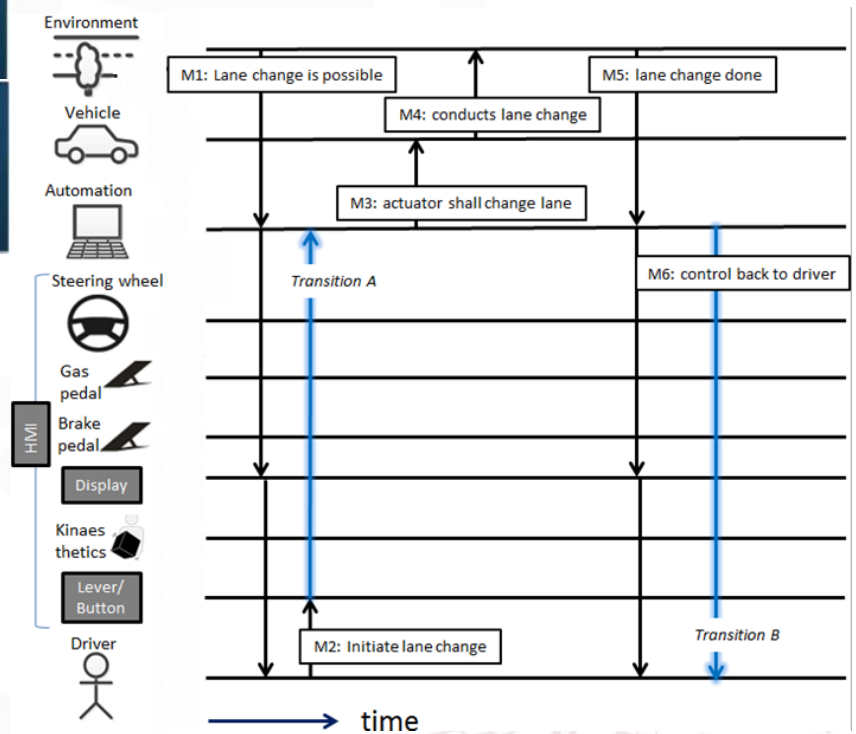


Close distance maneuvers (SP4)	• Activation/Deactivation with/without driver in car • Parking in/out • Drive to parking lot • Pass through construction site
Urban Scenarios (SP5)	• Activation/Deactivation • In lane lateral and longitudinal control • Lane change (driver/system initiated) • Handling of traffic lights/intersections/roundabouts
Highway Scenarios (SP6)	• Activation/Deactivation • Lane Following • Lane Change • Enter/Exit motorway • Cooperative Use Cases (using C2X-Technology) • Driver State

28 functions in total



Main Flow: Driver initiated lane change

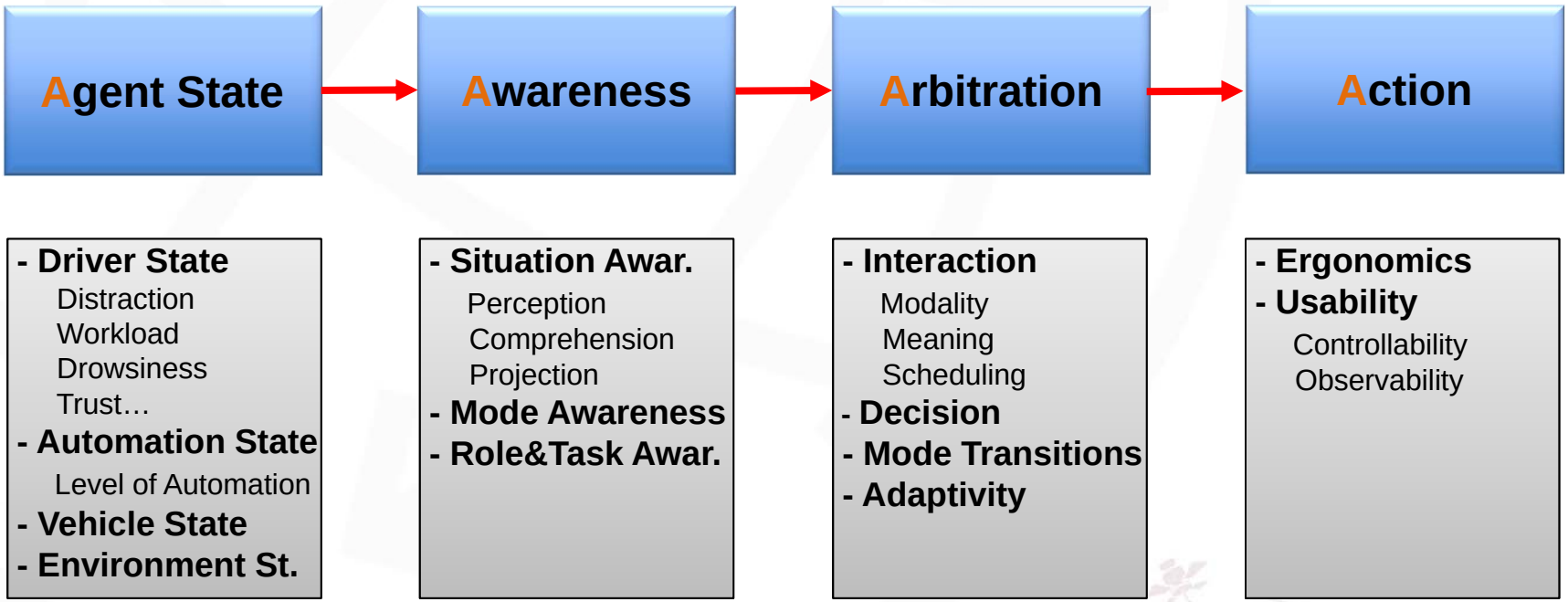


65 use cases in total

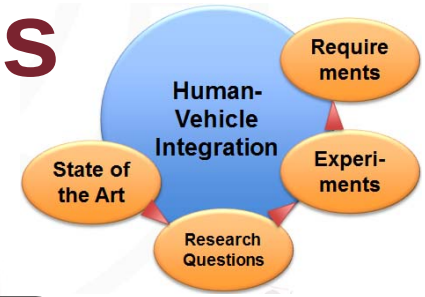
Integration & structuring: 4A

Human-Vehicle Integration

Main idea: Cognitive **informational processing** =
= 'common denominator' in cognitive systems



Using 4A for Human Factors requirements



Put state of the art in 4A as existing requirements

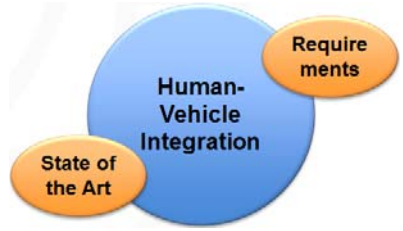
Look within 4A for new challenges

Formulate challenges as research questions

Answer research questions within experiments

Put exp. results in 4A as new requirements

Requirements Catalogue



No.	Category	Human Factors requirement	Human Factors challenge	Impact on demonstrator & other comments

Agent State

Awareness

Arbitration

Action

3.1 Agent State

FR1A 01	Automation state Environmen t state	Partial Automation Conditional Automation High Automati	Conti, BMW, VCC, VTEC, VW, DAI	high	ok	The automation should show its availability for activation to the driver NFR1A01.1 If available, use a local visual feedback (blue blinking	Driver must know when the preconditions for automation activation are fulfilled	HAVEit D33.2	FR1A01.E1: Example for display design from HAVEit 	

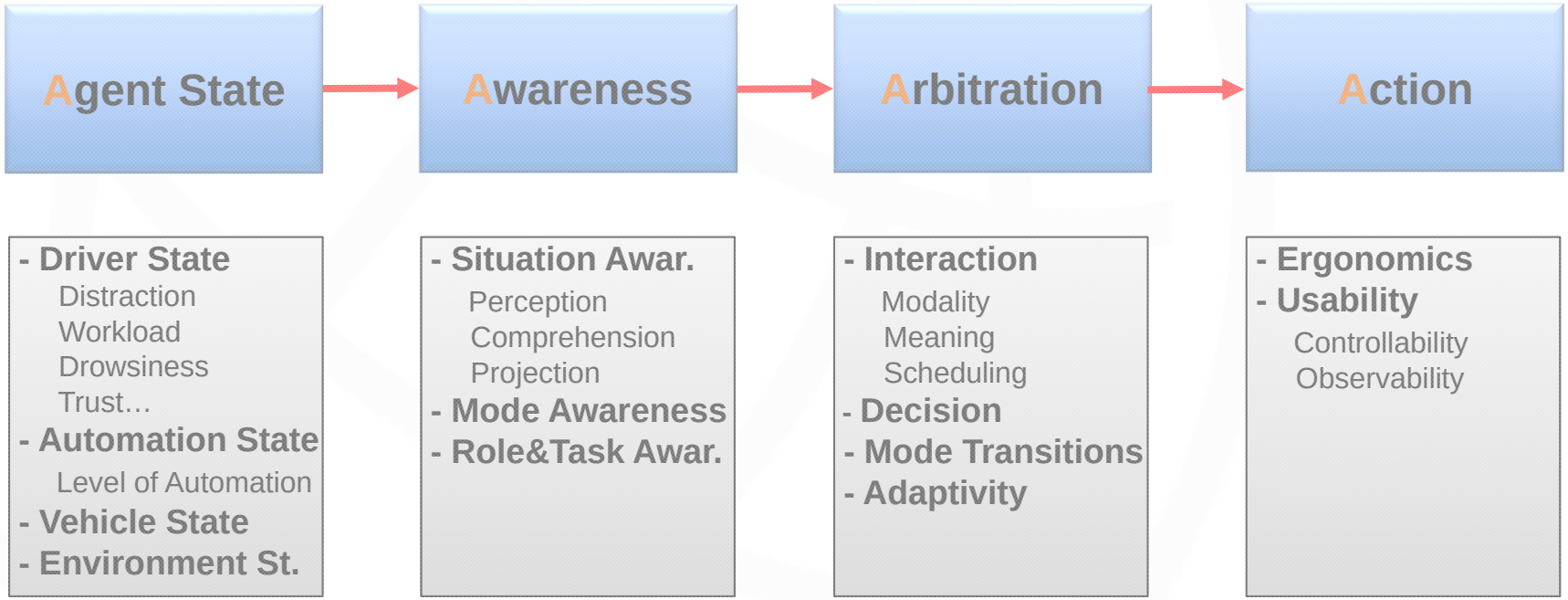
3.2 Awareness

FR2A 01	Mode awareness	Partial Automation Conditional Automation	Conti, VTEC, VCC, BMW, VW	Mid-high	ok	Current automation manoeuvre should/may be displayed Depending on manoeuvre	The driver is not aware of the automation's current manoeuvre and the manner in which the automation is controlling the vehicle	InteractIVe D3.2, P. 20 Endsley 1995	FR2A01.E1: show icons for lane changes, speed change, route change, platoon joining/leaving Display design example from InteractIVe 
FR2A 02	Mode awareness	All automation levels	BMW, Conti, VCC? (first one), VTEC(first one), , VW (first	High	ok	Cur sha dis cor spe fun SAE If tl sev lev			

3.3 Arbitration

FR3A 01	Interaction & Decision	High automation, conditional automation	?	?	?	In case of an unresponsive driver, the automation should be able to go into a minimum risk state (MRS) Check with diver state NFR3A01.1: Info/warning to drivers should escalade to make driver to take back control. NFR3A01.2: Escalation can include vehicle manoeuvres such as swaying in the lane to encourage take over. NFR3A0122.3: As long as lane detection possible the vehicle should remain moving to avoid risk exposure due to stand still. NFR3A01.4: E-call should be initiated if driver do not response	The automation cannot use the driver as a fall-back	HAVEit D33.2	 Take over signal (escalating in loudness and frequency) Take over signal (highest escalation)  FR3A01.E1: Driver is not responding to take over request, perform a transition from take-over request to minimum risk manoeuvre The reason for activating the MRS should be clearly communicated to the driver

EU-AdaptIVe: 4A-Structure



How do you mitigate complexity?

SP3

Picture: Nadja Schöming